UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2003/01044

November 10, 2003

Mr. Lawrence C. Evans
Portland District, Corps of Engineers
CENWP-OP-GP (Marg)
P.O. Box 2946
Portland, OR 97208-2946

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery and Conservation Management Act Essential Fish Habitat Consultation, West Breakwater Replacement Project at the West Mooring Basin in Astoria, Columbia River Estuary, Clatsop County, Oregon (Corps No. 200100353)

Dear Mr. Evans:

Enclosed is a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of the proposed issuance of a U.S. Army Corps of Engineers permit for a breakwater replacement project in Astoria, Clatsop County, Oregon. In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of twelve ESA-listed salmonids, or destroy or adversely modify their designated critical habitat. As required by section 7 of the ESA, NOAA Fisheries has included reasonable and prudent measures with nondiscretionary terms and conditions that are necessary to minimize the impact of incidental take associated with this action.

This document also serves as consultation on essential fish habitat pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations (50 CFR Part 600).

Please direct any questions regarding this consultation to Robert Markle of my staff in the Oregon Habitat Branch at 503.230.5419.

Sincerely,

for Michael R Crouse

D. Robert Lohn
Regional Administrator

Endangered Species Act - Section 7 Consultation
Biological Opinion

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Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

West Breakwater Replacement Project at the West Mooring Basin
Columbia River Estuary, Astoria, Clatsop County, Oregon
(Corps No. 200100353)

Agency: U.S. Army Corps of Engineers, Portland District

Consultation Conducted By: NOAA's National Marine Fisheries Service, Northwest Region

Date Issued: November 10, 2003

Issued by: for Michael R Crouse

D. Robert Lohn
Regional Administrator

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1. INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1544), as amended, establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with U.S. Fish and Wildlife Service and NOAA's National Marine Fisheries Service (NOAA Fisheries), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats. This biological opinion (Opinion) is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations found at 50 CFR 402.

The analysis also fulfills the essential fish habitat (EFH) requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2)).

1.1 Background and Consultation History

On August 15, 2003, NOAA Fisheries received a letter from the U.S. Army Corps of Engineers (Corps) requesting formal consultation pursuant to section 7(a)(2) of the ESA, and EFH consultation pursuant to section 305(b)(2) of the MSA for issuance of a permit by the Corps under section 10 of the Rivers and Harbors Act to reconstruct a breakwater at the West Mooring Basin in Astoria, Clatsop County, Oregon. On October 15, 2003, the Corps notified NOAA Fisheries that the applicant, Port of Astoria, had revised the scope of work to include the placement of riprap (R. Marg, Corps, personal communication via telephone conversation with R. Markle, NOAA Fisheries, October 15, 2003). On October 21, 2003, the Corps indicated the applicant had retracted the proposal to use riprap, and requested consultation be conducted on the scope of work provided in the original request for consultation (R. Marg, Corps, personal communication via telephone conversation with R. Markle, NOAA Fisheries, October 21, 2003).

The Corps did not submit a biological assessment (BA) describing the potential effects that may result from the project implementation with its letter; however, the letter described the proposed action, including how it would be completed. The Corps determined the proposed action was likely to adversely affect the following ESA-listed species: Snake River (SR) steelhead (*Oncorhynchus mykiss*), Upper Columbia River (UCR) steelhead, Middle Columbia River (MCR) steelhead, Upper Willamette River (UWR) steelhead, Lower Columbia River (LCR) steelhead, SR spring/summer-run chinook salmon (*O. tshawytscha*), SR fall-run chinook salmon, UCR spring-run chinook salmon, UWR chinook salmon, LCR chinook salmon, Columbia River (CR) chum salmon (*O. keta*), and SR sockeye salmon (*O. nerka*). The Corps also found that the proposed project may adversely affect designated EFH.

1.2 Proposed Action

The proposed action is issuance of a permit by the Corps under section 10 of the Rivers and Harbors Act to authorize the Port of Astoria to: (1) Construct a new 500-foot sheet pile breakwater west of the mooring basin entrance; (2) construct a new 85-foot sheet pile wing wall on the breakwater east of the mooring basin entrance; (3) relocate an existing mooring dolphin; and (4) excavate 31,000 cubic yards (cy) of material from the existing west breakwater structure at approximately river mile 13 on the Columbia River. The existing timber and rock breakwater was constructed in 1936, and is failing. The purpose of the project is to replace the existing west breakwater and construct a wing wall on the east breakwater to protect the basin entrance from "confused" water.

The new 500-foot sheet pile wall would be constructed on the river side of the west breakwater at the toe of the existing structure. Construction of the breakwater and wing wall would require installation of 100 30-inch diameter steel piles (85 piles for the breakwater and 15 piles for the wing wall) using a vibratory hammer staged from a barge. Interlocking sheet-pile wings would connect the piles. The sheet pile would extend to a depth of -12 feet below mean lower-low water. The bottom in the subject area varies in depth with a maximum of -20 feet. A 2- to 8-foot opening would exist below the sheet pile. Nine steel piles associated with an existing mooring dolphin would be removed and replaced with a three-pile mooring dolphin. The new dolphin would be made of steel pipe pile and have a 10-foot by 10-foot cap. Rock, treated wood, and cable ties associated with the existing breakwater would be excavated using an excavator or clamshell from the existing breakwater structure (*i.e.*, above mean higher-high water). All excavated material would be disposed at an upland disposal site. No sediment test information was provided. All in-water work (defined as all work below top-of-bank) would occur within the in-water work window of November 1 through February 28 recommended by the Oregon Department of Fish and Wildlife (ODFW) (ODFW 2000).

Conservation measures in the following categories would apply (see consultation proposal for details): (1) Timing of in-water work; (2) use of vibratory hammer for pile installation; (3) preventive measures to keep materials from entering the river; (4) a pollution plan, including a spill prevention, containment, and control plan; and (5) a barge depth restriction. NOAA Fisheries regards the conservation measures included in the consultation request as intended to minimize adverse effects to NOAA Fisheries' trust resources, and considers them to be part of the proposed action.

1.3 Description of the Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area (project area) involved in the proposed action (50 CFR 402.02). For this consultation, NOAA Fisheries defines the action area as all riverine habitats accessible to the subject species in the Columbia River from river mile 12.5 to river mile 13.5.

2. ENDANGERED SPECIES ACT

2.1 Biological Opinion

2.1.1. Biological Information and Critical Habitat

This biological opinion (Opinion) considers the potential effects of the proposed action on SR steelhead, UCR steelhead, MCR steelhead, UWR steelhead, LCR steelhead, SR spring/summer-run chinook salmon, SR fall-run chinook salmon, UCR spring-run chinook salmon, UWR chinook salmon, LCR chinook salmon, CR chum salmon, and SR sockeye salmon. The subject action will occur within designated critical habitat for SR fall-run chinook, SR spring/summer-run chinook salmon, and SR sockeye salmon. Species' listing dates, critical habitat designations, and take prohibitions are listed in Table 1. The objective of this Opinion is to determine whether the proposed action is likely to jeopardize the continued existence of the ESA-listed species, or destroy or adversely modify designated critical habitat for SR fall-run chinook, SR spring/summer-run chinook salmon, and SR sockeye salmon. This consultation is conducted pursuant to section 7(a)(2) of the ESA and its implementing regulations, 50 CFR 402.

Based on migratory timing, listed salmon or steelhead species likely will be present in the action area during the proposed construction period. The action area serves predominately as a migration corridor for both adult and juvenile salmon and steelhead, and secondarily as rearing and saltwater acclimation habitat for juvenile salmon and steelhead. All ESA-listed salmon and steelhead in the Columbia River must pass through lower river and estuary twice: Once as juveniles en route to the Pacific Ocean, and again as adults when they return to spawn. An essential habitat for out-migrating juveniles as they transition from a freshwater to marine environment, some species may reside in the estuary for months before entering the ocean. Adult salmon returning to the Columbia River migrate through the action area throughout the year, with the majority moving through this area from early spring through autumn.

Steelhead migrate year-round, with peak smolt out-migration occurring May through June, and peak adult migration occurring January through June. Sockeye salmon migrate April through August, with peak smolt out-migration occurring May through June, and peak adult migration occurring June through July.

Chinook salmon migrate year-round, with peak smolt out-migration occurring March through July, and peak adult migration occurring March through October. Chum salmon migrate October through May, with peak smolt out-migration occurring March through May, and peak adult migration occurring October through November. Subyearling (fall) chinook and chum salmon commonly are found within a few meters of the shoreline at water depths of less than 1 meter. Although they migrate between areas over deeper water, they generally remain close to the water surface and near the shoreline during rearing, favoring water no more than 2 meters deep and areas where currents do not exceed 0.3 meter per second. They seek low-energy areas without waves or currents that require them to expend energy to remain in position and where invertebrates that live on or near the substrate are available as food. These areas are characterized by relatively fine-grain substrates. However, it is not uncommon to find young salmonid fishes in areas with harder substrates, such as sand and gravel.

NOAA Fisheries designates critical habitat based on physical and biological features that are essential to the listed species. The essential features of designated critical habitat within the action area that support successful migration, smoltification, and rearing for ESA-listed salmonid fishes include: (1) Substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food (primarily juveniles), (8) riparian vegetation, (9) space, and (10) safe passage conditions. The proposed project may affect the following six essential features: Substrate, water quality, water velocity, food, space, and safe passage conditions resulting from the proposed action. Salmon and steelhead without designated critical habitat have the same needs.

2.1.2 Evaluating Proposed Actions

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR 402.02 (the consultation regulations). In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps of the consultation regulations and when appropriate combines them with its Habitat Approach (NOAA Fisheries 1999): (1) Consider the biological requirements of the listed species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species; and (4) determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages. In completing this step of the analysis, NOAA Fisheries determines whether the action under consultation, together with cumulative effects when added to the environmental baseline, is likely to jeopardize the ESA-listed species. If so, step 5 occurs. In step 5, NOAA Fisheries may identify reasonable and prudent alternatives for the action that avoid jeopardy, if any exist.

The fourth step above requires a two-part analysis. The first part focuses on the action area and defines the proposed action's effects in terms of the species' biological requirements in that area (*i.e.*, effects on habitat features). The second part focuses on the species itself. It describes the action's effects on individual fish, or populations, or both, and places these effects in the context of the evolutionarily significant unit (ESU) as a whole. Ultimately, the analysis seeks to answer the question of whether the proposed action is likely to jeopardize a listed species' continued existence.

2.1.3 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying the ESA section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species taking into account population size, trends, distribution and genetic diversity. To assess to the current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species for ESA protection and also considers new data available that is relevant to the determination.

The biological requirements are population characteristics necessary for the subject species to survive and recover to naturally-reproducing population levels, at which time protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance its capacity to adapt to various environmental conditions, and allow it to become self-sustaining in the natural environment.

For actions that affect freshwater habitat, NOAA Fisheries usually describes the habitat portion of a species' biological requirements in terms of a concept called properly functioning condition (PFC). PFC is defined as the sustained presence of natural, habitat-forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation (NOAA Fisheries 1999). PFC, then, constitutes the habitat component of a species' biological requirements. Pacific salmon and steelhead survival in the wild depends upon the proper functioning of ecosystem processes, including habitat formation and maintenance. Restoring functional habitats depends largely on allowing natural processes to increase their ecological function, while at the same time removing adverse effects of current practices. For this consultation, the biological requirements are improved habitat characteristics that would function to support successful adult migration, juvenile rearing and migration, and smoltification (see Table 1 for references).

Table 1. Endangered, Threatened, and Candidate Pacific Salmon under NOAA Fisheries' Jurisdiction in Columbia River Basin.

Evolutionarily Significant Unit	**Final Rule** E = Endangered T = Threatened C = Candidate	**Critical habitat (Final Rule)**	**Protective Regulations (Final Rule)**
Upper Columbia River Spring Chinook Salmon	E: March 24, 1999; 64 FR 14308	N/A	ESA section 9 applies
Snake River Fall Chinook Salmon	T: April 22, 1992; 57 FR 14653	December 28, 1993; 58 FR 68543	April 22, 1992; 57 FR 14653
Snake River Spring/Summer Chinook Salmon	T: April 22, 1992; 57 FR 146531	October 25, 1999; 64 FR 57399[1]	April 22, 1992; 57 FR 14653
Upper Willamette River Chinook Salmon	T: March 24, 1999; 64 FR 14308	N/A	July 10, 2000; 65 FR 42422
Lower Columbia River Chinook Salmon	T: March 24, 1999; 64 FR 14308	N/A	July 10, 2000; 65 FR 42422
Snake River Basin Steelhead	T: August 18, 1997; 62 FR 43937	N/A	July 10, 2000; 65 FR 42422
Middle Columbia River Steelhead	T: March 25, 1999; 64 FR 14517	N/A	July 10, 2000; 65 FR 42422
Upper Willamette River Steelhead	T: March 25, 1999; 64 FR 14517	N/A	July 10, 2000; 65 FR 42422
Lower Columbia River Steelhead	T: March 19, 1998; 63 FR 13347	N/A	July 10, 2000; 65 FR 42422
Upper Columbia River Steelhead	E: August 18, 1997; 62 FR 43937	N/A	ESA section 9 applies
Lower Columbia River/SW Washington Coho Salmon	C: July 25, 1995; 60 FR 38011	N/A	N/A
Columbia River Chum Salmon	T: March 25, 1999; 64 FR 14508	N/A	July 10, 2000; 65 FR 42422
Snake River Sockeye Salmon	E: November 20, 1991; 56 FR 58619	December 28, 1993; 58 FR 68543	ESA section 9 applies

2.1.4 Environmental Baseline

The Columbia River has been affected and shaped over eons by a variety of natural forces, including volcanic activity, storms, floods, natural events, and climatological changes. These forces had and continue to have a significant influence on biological factors, habitat, inhabitants, and the riverine and estuarine environments of the Columbia River.

Over the past century, human activities have dampened the range of physical forces in the action area and resulted in extensive changes in the lower Columbia River and estuary. To a significant degree, the risk of extinction for salmon stocks in the Columbia River basin has increased because complex freshwater and estuarine habitats needed to maintain diverse wild salmon populations and life histories have been lost and fragmented. Estuarine habitat has been lost or altered directly through diking, filling, and dredging, and also has been degraded through changes to flow regulation that affect sediment transport and salinity ranges of specific habitats within the estuary. Not only have salmonid rearing habitats been eliminated, but the connections among habitats needed to support tidal and seasonal movements of juvenile salmon have been severed.

The lower Columbia River estuary lost approximately 43% of its tidal marsh (from 16,180 acres historically to 9,200 acres today), and 77% of its historic tidal swamp habitats (from 32,020 acres historically to 6,950 acres today) between 1870 and 1970 (Thomas 1983). One example is the diking and filling of floodplains formerly connected to the tidal river, which has eliminated large expanses of low-energy, off-channel habitat for salmon rearing and migrating during high flows. Similarly, diking of estuarine marshes and forested wetlands within the estuary have removed most of these important off-channel habitats.

The total volume of the estuary has declined by about 12% since 1868. Production of emergent vegetation has declined by 80%, and benthic algal production has declined by 15%. The pre-development river mouth was characterized by shifting shoals, sandbars, and channels forming ebb and flood tide deltas. Before jetty construction, the navigable channel over the tidal delta varied from a single, relatively deep channel in some years to two or more shallow channels in other years (Sherwood *et al.* 1990).

Within the lower Columbia River, diking, river training devices (pile dikes and rip rap), railroads, and highways have narrowed and confined the river to its present location. Between the Willamette River and the mouth of the Columbia River, diking, flow regulation, and other human activities have resulted in a confinement of 84,000 acres of flood plain that likely contained large amounts of tidal marsh and swamp. The lower Columbia River's remaining tidal marsh and swamp habitats are in a narrow band along the Columbia River and its tributaries' banks and around undeveloped islands.

Since the late 1800s, the Corps has been responsible for maintaining navigation safety on the Columbia River. During that time, the Corps has taken many actions to improve and maintain the navigation channel. The channel has been dredged periodically to make it deeper and wider, as well as annually for maintenance. To improve navigation and reduce maintenance dredging, the navigation channel has also been realigned and hydraulic control structures, such as in-water fills, channel constrictions, and pile dikes, have been built. Most of the present-day pile dike system was built in the periods 1917-23 and 1933-39, with an additional 35 pile dikes constructed between 1957 and 1967.

Flow regulation, water withdrawal and climate change have reduced the Columbia River's average flow and altered the seasonality of Columbia River flows, sediment discharge and turbidity (Sherwood *et al.* 1990; Simenstad et al. 1990, 1992; Weitkamp 1995). Annual spring freshets through the Columbia River estuary are approximately one-half of historical flows that flushed the estuary and carried smolts to sea, and total sediment discharge is approximately one-third of 19th Century levels. For instance, flow regulation that began in the 1970s has reduced the 2-year flood peak discharge, as measured at The Dalles, Oregon, from 580,000 cubic feet per second (cfs) to 360,000 cfs (Corps 1999).

These aforementioned physical changes also affect other factors in the riverine and estuarine environment. Tides raise and lower river levels at least 4 feet, and up to 12 feet twice every day. The historical range for tides was probably similar, but seasonal ranges and extremes in water surface elevations have certainly changed because of river flow regulation. The salinity level in areas of the estuary can vary from zero to 34 parts per thousand (ppt) depending on tidal intrusion, river flows, and storms. Flow regulation has affected the upstream limit of salinity intrusion. The salinity wedge likely ranged from the river mouth to as far upstream as RM 37.5 in the past, and likely now ranges between the river mouth and RM 30. The river bed within the navigation channel is composed of a continuously moving series of sand waves that can migrate up to 20 feet per day at flows of 400,000 cfs or greater. This rate of river discharge is not experienced as often as it was before flow regulation in the Columbia River.

Analysis of fish tissues from the Columbia River estuary indicated the presence of contaminants in the food chain of juvenile salmon and steelhead. In fish from a site near Sand Island, in the mouth of the Columbia River, whole body concentrations of dichlorodiphenyl trichloroethane (DDT) and polychlorinated biphenyls (PCB) were 44 ng/g wet wt (~ 220 ng/g dry wt) and 53 ng/g wet wt (~ 265 ng/g dry wt), respectively (Collier *et al.* 2001). The elevated concentrations of DDTs and PCBs in stomach contents of fish from Sand Island indicates that fish are being exposed to these contaminants while they are in the estuary. Stomach contents had 52 ng/g wet weight of DDT, and 33 ng/g wet weight of PCBs. Although the Sand Island samples were collected from a mixed population of hatchery and wild fish, and although DDT and PCBs in hatchery food likely contributed to body burdens, the values seen were among the highest measured at estuarine sites in Washington and Oregon. By comparison, in the Duwamish estuary, a heavily contaminated industrial estuary near Seattle, mean whole body DDT in juvenile chinook salmon was 25 ng/g wet wt (~125 ng/g dry wt) and whole body PCB was 68 ng/g wet wt (~340 ng/g dry wt)(Collier *et al.* 2001).

Concentrations of PCBs and DDTs were consistently elevated in chinook salmon collected from Sand Island in the mouth of the Columbia River in 1999 and 2000 (Collier *et al.* 2001). Concentrations of DDT in salmon bodies ranged from 32 to 56 ng/g dry wt, and concentrations of PCBs ranged from 23 to 160 ng/g dry wt (Collier *et al.* 2001). No significant differences in mean concentrations of either of these contaminants were found over the 3 years during which fish were sampled.

Concentrations of PCBs in Sand Island fish approached or even exceeded estimated threshold tissue concentrations for adverse effects in salmonid fishes (Meador 2000). These values range from 120-360 ng/g dry wt for fish with total body lipid concentrations of 1-3%, which are typical of juvenile salmon collected within Pacific Northwest estuaries. At an average of 265 ng/g dry wt, PCB concentrations in Sand Island fish were well within the range of the effects threshold.

Exposure to polyaromatic hydrocarbons (PAH) may be quite variable in juvenile salmon from the lower Columbia River. In stomach contents of juvenile chinook salmon collected near Sand Island in 1998, PAHs were barely detectable, were below concentrations in salmon from moderately developed estuaries such as Yaquina Bay and Grays Harbor, and were below levels found in stomach contents of salmon from industrialized waterways of Puget Sound (Collier *et al.* 2001). Similarly, concentrations of PAH metabolites in bile were relatively low in juvenile salmon from Sand Island in comparison to fish from urban Puget Sound sites (*e.g.*, the Duwamish and Hylebos Waterways) (Collier *et al.* 2001). Concentrations of PAHs and their metabolites in both stomach contents and fish bile were considerably higher in juvenile salmon sampled near Sand Island in 2000 than in 1998 (Collier *et al.* 2001). Concentrations in 2000 were lower than those observed in fish from urban estuaries in Puget Sound, but were comparable to those observed in fish from moderately developed estuaries along the Washington and Oregon coast, such as Yaquina Bay and Coos Bay in Oregon.

These data indicate that juvenile salmonid fishes within the Columbia River estuary have contaminant body burdens that may be within the range where sublethal effects may occur, although the sources of exposure are not clear.

2.1.5 Analysis of Effects

2.1.5.1 Effects of Proposed Actions

<u>Acoustic Energy</u>

Intense underwater sound pressure waves, like those generated by pile driving, can injure or kill fishes (Caltrans 2001; Longmuir and Lively 2001; Stotz and Colby 2001; J. Stadler, NOAA Fisheries, Washington Habitat Branch, pers. obs. 2002). Injuries associated directly with these pressure waves are poorly studied, but include rupture of the swimbladder and internal hemorrhaging (Caltrans 2001; Abbott and Bing-Sawyer 2002; Stadler, NOAA Fisheries, Washington Habitat Branch, pers. obs. 2002). Sound pressures 100 decibels (dB) above the threshold for hearing likely are sufficient to damage the auditory system in many fishes (Hastings 1995). Feist *et al.* (1992) reported sound pressure increased up to 25 dB above ambient levels from pile driving, at a range of 1,946 feet from the source at a depth of 5 feet.

The type and intensity of the sounds produced during pile driving depend on a variety of factors, including, but not limited to, the type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water and the type and size of the pile-driving hammer. Sound pressures are positively correlated with the size of the pile, as more energy is required to drive larger piles. Hollow steel piles as small as 14 inches in diameter have been shown to produce sound pressures that can injure fish (Reyff 2003). Firmer substrates require more energy to drive piles, and produce more intense sound pressures. Sound attenuates more rapidly with distance from the source in shallow water than in deep water (Rogers and Cox 1988).

Driving hollow steel piles with impact hammers produces intense, sharp spikes of sound which can easily reach levels that injure fishes. Vibratory hammers, on the other hand, produce sounds of lower intensity, with a rapid repetition rate. Sounds produced by impact hammers and those produced by vibratory hammers evoke different responses in fishes. When exposed to sounds which are similar to those of a vibratory hammer, fishes consistently displayed an avoidance response (Enger *et al*. 1993, Dolat 1997, Knudsen *et al*. 1997, Sand *et al*. 2000), and did not habituate to the sound, even after repeated exposure (Dolat 1997, Knudsen *et al*. 1997). Fishes may respond to the first few strikes of an impact hammer with a startle response. After these initial strikes, the startle response wanes and the fishes may remain within the field of a potentially harmful sound (Dolat 1997).

Fishes respond to particle acceleration of 0.01 m/s^{-2} at infrasound frequencies. The response to infrasound is limited to the nearfield in relation to the source (< 1 wavelength), and the fish must be exposed to the sound for several seconds (Enger *et al*. 1993, Knudsen *et al*. 1994, Sand *et al*. 2000). Impact hammers, however, produce such short spikes of sound, with so little energy in the infrasound range, that fishes fail to respond to the particle motion (Carlson *et al*. 2001). Thus, impact hammers may be more harmful than vibratory hammers for two reasons: (1) They produce more intense pressure waves, and (2) the sounds produced do not elicit an avoidance response in fishes, which will expose them for longer periods to the harmful pressures.

Pile installation is likely to lead to acoustic energy effects on salmonid fishes similar to those described above that are likely to persist over a period of hours of a given day during construction. Installing piles during the proposed in-water work window using a vibratory hammer is likely to minimize the above effects as juvenile salmon and steelhead abundance in the action area would be low and those present are likely to relocate out of the affected area.

<u>Total Suspended Solids and Turbidity</u>
A 1997 analysis provided by the Corps for a previous consultation (OSB2001-0156) in the mooring basin indicated that the basin contained a high percentage of fine sediments (97.3%). Potential effects from project related increases in turbidity on salmon and steelhead include, but are not limited to: (1) Reduction in feeding rates and growth; (2) increased mortality; (3) physiological stress; (4) behavioral avoidance; (5) reduction in macroinvertebrate populations; and (6) temporary beneficial effects, including a reduction in piscivorous fish/bird predation rates, enhanced cover conditions, and improved survival conditions.

Turbidity is defined as a measurement of relative clarity due to an increase in dissolved or suspended, undissolved particles. At moderate levels, turbidity can reduce primary and secondary productivity and, at high levels, has the potential to interfere with feeding and to injure or kill adult and juvenile fish (Spence *et al.* 1996, Bjornn and Reiser 1991). Other behavioral effects on fish, such as gill flaring and feeding changes, have been observed in response to pulses of suspended sediment (Berg and Northcote 1985). Fine, redeposited sediments can also reduce primary and secondary productivity (Spence *et al.* 1996), and reduce incubation success and interstitial rearing space for juvenile salmonids (Bjornn and Reiser 1991). Salmonid fishes have been observed to move laterally and downstream to avoid turbid plumes (Sigler *et al.* 1984, Lloyd 1987, Servizi and Martens 1991). Juvenile salmonid fishes tend to avoid streams that are chronically turbid, such as glacial streams or those disturbed by human activities, except when the fish must traverse these streams along migration routes (Lloyd *et al.* 1987). Fish that remain in turbid waters experience a reduction in predation from piscivorous fish and birds (Gregory and Levings 1998). In habitats with intense predation pressure, this provides a beneficial trade-off of enhanced survival in exchange for physical effects such as reduced growth.

Exposure duration is a critical determinant of the occurrence and magnitude of physical or behavioral effects (Newcombe and MacDonald 1991). Salmonid fishes have evolved in systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with floods, and are adapted to such high pulse exposures. Adult and larger juvenile salmonid fishes appear to be little-affected by the high concentrations of suspended sediments that occur during storm and snowmelt runoff episodes (Bjornn and Reiser 1991). However, chronic exposure can cause physiological stress that can increase energy required for maintenance and reduce feeding and growth (Redding *et al.* 1987, Lloyd 1987, Servizi and Martens 1991).

Increases in total suspended solids (TSS) can adversely affect filter-feeding macroinvertebrates and fish feeding. At concentrations of 53 to 92 ppm (24 hours) macroinvertebrate populations were reduced (Gammon 1970). Concentrations of 250 ppm (1 hour) caused a 95% reduction in feeding rates in juvenile coho salmon (Noggle 1978). Concentrations of 1200 ppm (96 hours) killed juvenile coho salmon (Noggle 1978). Concentrations of 53.5 ppm (12 hours) caused physiological stress and changes in behavior in coho salmon (Berg 1983).

The proposed pile installation is likely to increase turbidity upstream and downstream of the work area for sustained periods (hours). These increases in turbidity are likely to increase physiological stress and displace rearing juveniles, potentially reducing availability of rearing habitat and possibly reducing survival. Installing piles during the proposed in-water work window is likely to minimize the above effects as juvenile salmon and steelhead abundance in the action area would be low.

<u>Contaminants</u>

The Corps provided no information regarding the abundance or distribution of contaminants at the proposed dredging site. Composite sediment testing completed in the mooring basin in 1997 and provided by the Corps for a previous consultation (OSB2001-0156) indicated elevated concentrations of tributyltin (TBT) and polycyclic aromatic hydrocarbon (PAH); however, contaminant concentrations did not exceed the threshold levels that NOAA Fisheries considers harmful.[1] Since the existing breakwater proposed for removal was constructed before the use of TBT compounds (circa 1950's), the likelihood that sediment below the breakwater is contaminated with TBT is low. However, the use of other compounds of concern (*e.g.*, metals and PCB) predate construction of the breakwater (1936) and may exist in underlying sediments. Although it was first synthesized in 1873, DDT was not widely used until after 1939 when the insecticidal properties of the compound were realized. The proposed removal of wood cribbing, and to a lesser extent pile installation, may re-suspend contaminated sediments.

As with all construction activities, accidental release of fuel, oil, and other contaminants that contain harmful PAHs may occur. Operation of pile driving equipment requires the use of fuel, lubricants, *etc.*, which contain petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids that could injure or kill aquatic organisms if spilled into a waterbody. The proposed action includes a spill containment and control plan, however, the Corps provided no details of the plan, so its potential effectiveness cannot be evaluated.

Migration of PAHs from treated wood in lotic environments may adversely affect juvenile salmonid fishes (NOAA Fisheries 1998). Some PAHs are very toxic and bioconcentrate (NOAA Fisheries 1998). Potential effects of elevated water column and sediments concentrations of PAHs to the subject species include, but are not limited to: (1) Reduced growth and survival rates, (2) altered hematology, and (3) increased deformities in fry (Sorensen 1991, Eisler 1998).

<u>Predation</u>

In-water structures may provide increased opportunities for salmonid predation. When a salmon stock suffers from low abundance, predation can contribute significantly to its extinction (Larkin 1979). In addition, the presence of predators may force smaller prey fish species into less desirable habitats, disrupting foraging behavior, resulting in less growth (Dunsmoor *et al*. 1991). Providing temporary respite from predation may contribute to increasing Pacific salmon (Larkin 1979). A substantial reduction in predators will generally result in an increase in prey abundance, in this case salmonids (Campbell 1979). In evaluating predation in the Columbia River Basin, Gray and Rondorf (1986) state "the most effective management program may be to reduce the susceptibility of juvenile salmonids to predation by providing maximum protection during their downstream migration." Campbell (1979), discussing management of large rivers and predator-prey relations, advocates that a "do nothing" approach (as opposed to predator manipulations) coupled with strong habitat protection, should receive serious consideration.

There are four major predatory strategies used by piscivorous fish: They overtake prey; ambush prey; habituate prey to a non-aggressive illusion; or stalk prey (Hobson 1979). Ambush predation is probably the most common strategy. Under such a strategy predators lie-in-wait, then dart out at the prey in an explosive rush (Gerking 1994). Predators may use sheltered areas that provide slack water to ambush prey fish in faster currents (Bell 1991).

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[1] E-mail message from Dr. James Meader, NOAA Fisheries' Northwest Fisheries Science Center, to Rob Markle, NOAA Fisheries, Oregon Habitat Branch, discussing a review of the sediment test results for the West Mooring Basin Breakwater Reconstruction Project (September 24, 2001).

Light plays an important role in defense from predation. Prey species are better able to see predators under high light intensity, thus providing the prey species with an advantage (Hobson 1979, Helfman 1981). Predator success is higher at lower light intensities (Petersen and Gadomski 1994). Prey fish lose their ability to school at low light intensities, making them vulnerable to predation (Petersen and Gadomski 1994). Shade, in conjunction with water clarity, sunlight and vision, is a factor in attraction of temperate lake fishes to overhead structure (Helfman 1981). Over-water structures cause shadows and low light intensity conditions in the water column below or adjacent to the structures, which may benefit predator fish species to the detriment of prey species.

In addition to providing conditions favorable to piscivorous predators, in-water structures (tops of pilings) also provide perching platforms for avian predators such as double-crested cormorants (*Phalacrocorax auritis*), from which they can launch feeding forays. Their high energy demands associated with flying and swimming create a need for voracious predation on live prey (Ainley 1984). Cormorants are underwater pursuit swimmers (Harrison 1983) that typically feed on mid-water schooling fish (Ainley 1984), but they are known to be highly opportunistic feeders (Derby and Lovvorn 1997; Blackwell *et al*. 1997; Duffy 1995). Double-crested cormorants are known to fish cooperatively in shallow water areas, herding fish before them (Ainley 1984). Cormorants can reduce fish populations in forage areas (Krohn *et al*. 1995), thus possibly reducing adult returns as a result of smolt consumption. Because their plumage becomes wet when diving, cormorants spend considerable time drying out feathers (Harrison 1983) on pilings and other structures near feeding grounds (Harrison 1984). Placement of piles to support in-water structures will potentially provide for some usage by cormorants. Placement of anti-perching devices on the top of the pilings would preclude their use by any potential avian predators.

An increase in predation on listed salmon by piscivorous fish or birds may result from the completion of the proposed project. While the proposed sheet pile structure will generate water column shadow lines and provide avian perches, these features may only marginally improve predation success relative to current site conditions.

2.1.5.2 Effects on Critical Habitat

NOAA Fisheries designates critical habitat based on physical and biological features that are essential to the listed species. Essential features of designated critical habitat include substrate, water quality, water quantity, water temperature, food, riparian vegetation, access, water velocity, space and safe passage. Effects to critical habitat from these categories are similar to the effects described above in section 2.1.5.

2.1.5.3 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation."

NOAA Fisheries is not aware of any specific future non-federal activities within the action area that would cause greater effects to listed species than presently occurs. Between 1990 and 2000, the population of Clatsop County increased by 7.0%.[2] Thus, NOAA Fisheries assumes that future private and state actions will continue within the action area, increasing as population density rises. As the human population in the state continues to grow, demand for actions similar to the subject project likely will continue to increase as well. Each subsequent action may have only a small incremental effect, but taken together they may have a significant effect that would further degrade the watershed's environmental baseline and undermine the improvements in habitat conditions necessary for listed species to survive and recover.

2.1.6 Conclusion

NOAA Fisheries has concluded that the proposed action is not likely to jeopardize the continued existence of SR steelhead, UCR steelhead, MCR steelhead, UWR steelhead, LCR steelhead, SR spring/summer-run chinook salmon, SR fall-run chinook salmon, UCR spring-run chinook salmon, UWR chinook salmon, LCR chinook salmon, CR chum salmon, or SR sockeye salmon, and is not likely to destroy or adversely modify designated critical habitat for SR fall-run chinook salmon, SR spring/summer-run chinook salmon, and SR sockeye salmon.

In reaching this conclusion, NOAA Fisheries used the best available scientific and commercial data to apply its jeopardy analysis, and analyzed the effects of the proposed action on the biological requirements of the species relative to the environmental baseline, together with cumulative effects. The proposed action is reasonably certain to cause short-term degradation of critical habitat due to reductions in water quality. The proposed action also is reasonably certain to injure or disrupt the behavior of listed juvenile salmonid fishes within approximately 1500 feet of the project area from increases in acoustic energy during pile installation. The incorporation of conservation measures, particularly in-water work timing, into the proposed action likely would reduce adverse effects to ESA-listed species. Based on the analysis in section 2.1.3, the proposed action is not likely to impair properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward proper functioning condition essential to the long-term survival and recovery of the subject species at the population or ESU scale.

2.1.7 Conservation Recommendations

Section 7(a)(1) of the ESA requires Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Conservation recommendations are discretionary measures suggested to avoid or minimize adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitats, or to develop additional information. NOAA Fisheries

[2] U.S. Census Bureau, State and County Quickfacts: Clatsop County, Oregon. Available online at http://quickfacts.census.gov/qfd/states/41/41007.html

believes the following recommendations are is consistent with these obligations, and therefore should be carried out by the Corps.

1. Consistent with the Corps Regulatory Guidance Letter No. 02-2,[3] ensure that the applicant develops appropriate and practicable mitigation to replace aquatic resource functions unavoidably lost or adversely affected by this activity. In developing this mitigation, the Corps should consider the following factors in light of guidelines developed by the National Research Council (2001): (1) Use of a watershed and ecosystem approaches when determining compensatory mitigation requirements; (2) the resource needs in the watershed where the impacts will occur; and (3) the resource needs of neighboring watersheds.

2. The Corps should develop a monitoring program to evaluate the effects of increases in acoustic energy from pile driving on salmonid fishes resulting from activities authorized by the Corps.

Please notify NOAA Fisheries if the Corps carries out these recommendations so that we will be kept informed of actions that minimize or avoid adverse effects, and those that benefit species or their habitats.

2.1.8 Reinitiation of Consultation

This concludes formal consultation on these actions in accordance with 50 CFR 402.14(b)(1). Reinitiation of consultation is required: (1) If the amount or extent of incidental take is exceeded; (2) the action is modified in a way that causes an effect on the listed species that was not previously considered in the biological assessment and this Opinion; (3) new information or project monitoring reveals effects of the action that may affect the listed species in a way not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

2.2 Incidental Take Statement

The ESA at section 9 [16 USC 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule [50 CFR 223.203]. Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." [16 USC 1532(19)] Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering." [50 CFR 222.102] Harass is defined as "an intentional or

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[3] U.S. Army Corps of Engineers, Regulatory Guidance Letter No. 02-2, Guidance on Compensatory Mitigation Projects for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 (December 24, 2002).

negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering." [50 CFR 17.3] Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant." [50 CFR 402.02] The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement [16 USC 1536].

2.2.1 Amount or Extent of Take

NOAA Fisheries anticipates that the proposed action covered by this Opinion is reasonably certain to result in incidental take of listed species resulting from changes in water quality and temporary increases in acoustic energy. Effects of actions such as these are largely unquantifiable in the short term, but are expected to be largely limited to non-lethal take in the form of behavior modification.

Therefore, even though NOAA Fisheries expects some low level of non-lethal incidental take to occur due to the action covered by this Opinion, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take to the species themselves. In instances such as this, NOAA Fisheries designates the expected level of take in terms of the extent of take allowed. Therefore, NOAA Fisheries limits the area of take from pile installation and breakwater removal to the aquatic area within approximately 1500 feet of the mooring basin entrance. Incidental take occurring beyond this area is not authorized by this consultation. Incidental take resulting from contaminant exposure is expressly not authorized.

2.2.2 Reasonable and Prudent Measures

The measures described below are non-discretionary. They must be implemented so that they become binding conditions in order for the exemption in section 7(a)(2) to apply. The Corps has the continuing duty to regulate the activities covered in this incidental take statement. If the Corps fails to require the applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

The following reasonable and prudent measures are necessary and appropriate to avoid or minimize the amount or extent of take of listed fish resulting from implementation of this Opinion. These reasonable and prudent measures would also avoid or minimize adverse effects to designated critical habitat.

The Corps shall:

1. Avoid or minimize incidental take from construction-related activities by applying permit conditions and project specifications that avoid or minimize adverse effects to riparian and aquatic systems.

2. Ensure completion of a comprehensive monitoring and reporting program to confirm this Opinion is meeting its objective of minimizing take from permitted activities.

2.2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary and are applicable to more than one category of activity. Therefore, terms and conditions listed for one type of activity are also terms and conditions of any category in which they would also minimize take of listed species or their habitats.

1. To implement reasonable and prudent measure #1 (construction), the Corps shall ensure that the following measures are carried out:

    a. Minimum area. Confine construction impacts to the minimum area necessary to complete the project.
    b. Timing of in-water work. Work below the bankfull elevation[4] will be completed between November 1 of a given year and February 28 of the following year, unless otherwise approved in writing by NOAA Fisheries.
    c. Piling installation. Install temporary and permanent pilings as follows.
        i. Minimize the number and diameter of pilings, as appropriate, without reducing structural integrity.
        ii. Under conditions where a drop or impact hammers are required for seismic stability, substrate type, or proofing, piles shall be driven as deep as possible using a vibratory hammer before using a drop or impact hammer.
        iii. Drive each piling as follows to minimize the use of force and resulting sound pressure.
            (1) When impact drivers will be used to install a pile, use the smallest driver and the minimum force necessary to complete the job. Use a drop hammer or a hydraulic impact hammer, whenever feasible, and set the drop height to the minimum necessary to drive the piling.

[4] 'Bankfull elevation' means the bank height inundated by a 1.5 to 2-year average recurrence interval and may be estimated by morphological features such average bank height, scour lines and vegetation limits.

(2) When using an impact hammer to drive or proof steel piles, use one of the following sound attenuation devices to reduce sound pressures by 20 decibels.

(a) Place a block of wood or other sound dampening material between the hammer and the piling being driven.

(b) If currents are 1.7 miles per hour or less, surround the piling being driven by an unconfined bubble curtain that will distribute small air bubbles around 100% of the piling perimeter for the full depth of the water column.[5]

(c) If currents greater than 1.7 miles per hour, surround the piling being driven by a confined bubble curtain (*e.g.*, a bubble ring surrounded by a fabric or metal sleeve) that will distribute air bubbles around 100% of the piling perimeter for the full depth of the water column.

(d) Other sound attenuation devices as approved in writing by NOAA Fisheries.

d. Piling removal. Remove temporary or permanent piling as follows.

i. Dislodge the piling with a vibratory hammer.

ii. Once loose, place the piling onto the construction barge or other appropriate dry storage site.

iii. If a treated wood piling breaks during removal, either remove the stump by breaking or cutting 3 feet below the sediment surface or push the stump in to that depth, then cover it with a cap of clean substrate appropriate for the site.

iv. Fill the holes left by each piling with clean, native sediments, whenever feasible.

e. Treated wood. Remove treated wood as follows:

i. Treated wood debris. Take care to ensure that no treated wood debris falls into the water. If treated wood debris does fall into the water, remove it immediately.

ii. Disposal of treated wood debris. Dispose of all treated wood debris removed during a project, including treated wood pilings, at an upland facility approved for hazardous materials of this classification. Do not leave any treated wood pilings in the water or stacked on the stream bank.

f. Excavation/Dredging.

i. Following removal of breakwater material, complete sediment testing of the final leave surface to establish sediment quality.

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[5] For guidance on how to deploy an effective, economical bubble curtain, see, Longmuir, C. and T. Lively, *Bubble Curtain Systems for Use During Marine Pile Driving*, Fraser River Pile and Dredge LTD, 1830 River Drive, New Westminster, British Columbia, V3M 2A8, Canada. Recommended components include a high volume air compressor that can supply more than 100 pounds per square inch at 150 cubic feet per minute to a distribution manifold with 1/16 inch diameter air release holes spaced every 3/4 inch along its length. An additional distribution manifold is needed for each 35 feet of water depth.

(1) A minimum of three samples, equally spaced within the newly exposed 45,000 square foot area, shall be taken.
(2) Samples shall be remain distinct and not be composited.
(3) A sample depth of 2 to 5 centimeters below the surface shall be used.
(4) At minimum, sediment samples shall be tested for metals, PAH, and PCB concentrations.

ii. Evaluate sediment test results for potential to harm listed species.
iii. Reinitiate consultation if evaluation suggests sediment quality may harm an ESA-listed species.

g. Piscivorous bird deterrence. An effort is made to develop and install a device that will minimize perching by piscivorous birds on the new breakwater.
h. Vehicle inspection. Inspect all vehicles operated within 150 feet of top-of-bank daily for fluid leaks before leaving the vehicle staging area. Repair any leaks detected in the vehicle staging area before the vehicle resumes operation.

2. To implement reasonable and prudent measure #2 (monitoring), the Corps shall:

a. Salvage notice. Include the following notice as a permit condition. NOTICE. If a sick, injured or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at 360.418.4246. The finder must take care in handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

b. Implementation monitoring. Ensure that the applicant completes monitoring and submits a report to the Corps and NOAA Fisheries within 120 days of the completion of all in-water work, to include the following.

i. Project identification

(1) Applicant name, permit number, and project name.
(2) Project location, including any compensatory mitigation site(s), by 5th field HUC and by latitude and longitude as determined from the appropriate USGS 7-minute quadrangle map.
(3) Corps contact person.
(4) Starting and ending dates for work completed.

ii. Photo documentation. Obtain photographs of habitat conditions at the project and any compensation site(s), before, during, and after project completion.[6]
   (1) Include general views and close-ups showing details of the project and project area, including pre and post construction.
   (2) Label each photo with date, time, project name, photographer's name, and a comment about the subject.

iii. Pilings.
   (1) Record and report the number and type of pilings removed, including the number of pilings (if any) that broke during removal.
   (2) Record and report the number, type, and diameter of any pilings installed (*e.g.*, untreated wood, treated wood, hollow steel).
   (3) Record and report how pilings were installed and any sound attenuation measures used.

iv. Sediment.
   (1) Provide the results of the sediment quality testing conducted after removal of existing breakwater, and required by term and condition 1.f. above.
   (2) Provide the evaluation of the potential for harm to ESA-listed species from sediment, as required by term and condition 1.f. above.

v. Submit a copy of the report to the Oregon Office of NOAA Fisheries.

Oregon State Director
Habitat Conservation Division
National Marine Fisheries Service
Attn: **OHB2003/01044**
525 NE Oregon Street
Portland, OR 97232

3. MAGNUSON-STEVENS ACT

3.1 Magnuson-Stevens Fishery Conservation and Management Act

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297), requires the inclusion of EFH descriptions in Federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH. The objective of the EFH consultation is to determine whether the proposed action may adversely affect designated EFH for relevant species, and to recommend conservation measures

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[6] Relevant habitat conditions may include characteristics of channels, eroding and stable streambanks in the project area, riparian vegetation, water quality, flows at base, bankfull and over-bankfull stages, and other visually discernable environmental conditions at the project area, and upstream and downstream of the project

to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the proposed action.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting the definition of essential fish habitat: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.110).

Section 305(b) of the MSA (16 U.S.C. 1855(b)) requires that:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;

- NOAA Fisheries shall provide conservation recommendations for any Federal or state activity that may adversely affect EFH;

- Federal agencies shall within 30 days after receiving conservation recommendations from NOAA Fisheries provide a detailed response in writing to NOAA Fisheries regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NOAA Fisheries, the Federal agency shall explain its reasons for not following the recommendations.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of their locations.

3.2 Identification of EFH

The Pacific Fisheries Management Council (PFMC) has designated EFH for Federally-managed fisheries within the waters of Washington, Oregon, and California. The designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (200 miles) (PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other waterbodies currently, or historically accessible to salmon in

Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (*e.g.*, natural waterfalls in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone offshore of Washington, Oregon, and California north of Point Conception to the Canadian border.

Detailed descriptions and identifications of EFH for the groundfish species are found in the Final Environmental Assessment/Regulatory Impact Review for Amendment 11 to *The Pacific Coast Groundfish Management Plan* (PFMC 1998a) and the NOAA Fisheries *Essential Fish Habitat for West Coast Groundfish Appendix* (Casillas *et al.* 1998). Detailed descriptions and identifications of EFH for the coastal pelagic species are found in Amendment 8 to the *Coastal Pelagic Species Fishery Management Plan* (PFMC 1998b). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the *Pacific Coast Salmon Plan* (PFMC 1999). Assessment of the potential adverse effects to these species' EFH from the proposed action is based on this information.

3.3 Proposed Actions

The proposed action is detailed above in section 1.2 of this document. The action area includes as all riverine habitats accessible to the subject species in the Columbia River from river mile 12.5 to river mile 13.5. This area has been designated as EFH for various life stages of numerous groundfish, coastal pelagic fish, and salmon species (Table 2).

3.4 Effects of Proposed Action

As described in detail in section 2.1.5 of this document, the proposed action is likely to temporarily degrade water quality, river substrate, and near-shore habitat for ground fish species, chinook and coho salmon, and coastal pelagic species due to temporarily increased turbidity, potential sediment and water column contamination, and increases in acoustic energy.

3.5 Conclusion

The proposed action is likely to adversely affect EFH for the groundfish, Pacific salmon species, and coastal pelagic listed in Table 2.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that would adversely affect EFH. The conservation measures proposed for the project by the Corps, all conservation recommendations outlined above in section 2.1.7 and all of the reasonable and prudent measures and the terms and conditions contained in sections 2.2.2 and 2.2.3, respectively, are applicable to EFH. Therefore, NOAA Fisheries incorporates each of those measures here as EFH conservation recommendations.

3.7 Statutory Response Requirement

Please note that the MSA (section 305(b)) and 50 CFR 600.920(j) requires the Federal agency to provide a written response to NOAA Fisheries after receiving EFH conservation recommendations within 30 days of its receipt of this letter. This response must include a description of measures proposed by the agency to avoid, minimize, mitigate or offset the adverse impacts of the activity on EFH. If the response is inconsistent with a conservation recommendation from NOAA Fisheries, the agency must explain its reasons for not following the recommendation.

3.8 Supplemental Consultation

The Corps must reinitiate EFH consultation with NOAA Fisheries if either action is substantially revised or new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920).

Table 2. Species with Designated EFH in the Estuarine EFH Composite in the State of Oregon.

Groundfish Species	
Leopard Shark (southern OR only)	*Triakis semifasciata*
Soupfin Shark	*Galeorhinus zyopterus*
Spiny Dogfish	*Squalus acanthias*
California Skate	*Raja inornata*
Spotted Ratfish	*Hydrolagus colliei*
Lingcod	*Ophiodon elongatus*
Cabezon	*Scorpaenichthys marmoratus*
Kelp Greenling	*Hexagrammos decagrammus*
Pacific Cod	*Gadus macrocephalus*
Pacific Whiting (Hake)	*Merluccius productus*
Black Rockfish	*Sebastes maliger*
Bocaccio	*Sebastes paucispinis*
Brown Rockfish	*Sebastes auriculatus*
Copper Rockfish	*Sebastes caurinus*
Quillback Rockfish	*Sebastes maliger*
English Sole	*Pleuronectes vetulus*
Pacific Sanddab	*Citharichthys sordidus*
Rex Sole	*Glyptocephalus zachirus*
Rock Sole	*Lepidopsetta bilineata*
Starry Flounder	*Platichthys stellatus*
Coastal Pelagic Species	
Pacific Sardine	*Sardinops sagax*
Pacific (Chub) Mackerel	*Scomber japonicus*
Northern Anchovy	*Engraulis mordax*
Jack Mackerel	*Trachurus symmetricus*
California Market Squid	*Loligo opalescens*
Pacific Salmon Species	
Chinook Salmon	*Oncorhyncus tshawytcha*
Coho Salmon	*Oncorhyncus kisutch*

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Section 7(a)(2) of the ESA requires biological opinions to be based on the best scientific and commercial data available. This section identifies the data used in developing this Opinion.

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